



Inventory Control

User's Manual

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1. User Interface

System Requirements:

- Microsoft Windows XP (SP2)
- Microsoft .NET Framework 2.0
- 1 COM port if used with Alien reader and passive RFID tags
- 2 or 4 COM ports if used with active transmitter/reciever

Installation:

- Follow the appropriate hardware installation guide for your choice of setup. (Alien RFID/Active Transmitter)
- Copy the appropriate program executable into the installation directory
 - InventoryAppACTIVE.exe for use with the active transmitters
 - InventoryAppALIEN.exe for use with the Alien reader and passive RFID tags
- Copy the database “inventory.mdb” into the installation directory

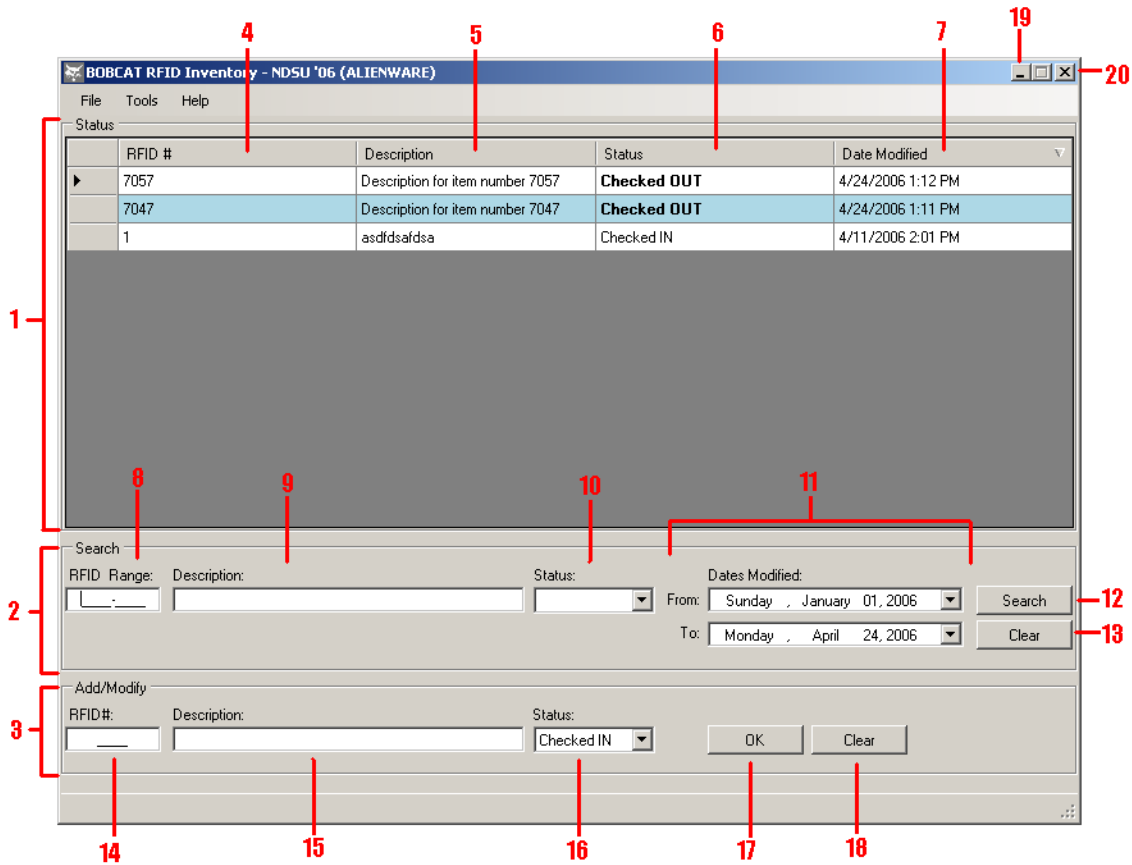
Launch the program by double-clicking the appropriate executable file (InventoryAppACTIVE.exe/InventoryAppALIEN.exe).

A screenshot of the user interface is shown on the following page. To add new items to the database enter the RFID# to be associated with the item in the ‘RFID#’ field (14) in the Add/Modify section (3). Enter the description of the item in the ‘Description’ field (15). Enter the current status of the item using the ‘Status’ pull-down menu (16). Click ‘OK’ (17) to submit that item into the database. A message will appear asking you to confirm the changes you wish to make. Select ‘Yes’ to add the item to the database or ‘No’ if you do not wish to add the information to the database.

To modify an item located in the database select the row in the data grid (1) containing the information for the item you wish to change. Once the row is selected the information is copied into the appropriate fields in the Add/Modify section (3) of the application. Change the data by modifying the fields and submitting the data to the database by selecting ‘OK’ (17). Alternatively you can manually enter information into the fields as well.

You may clear the fields in the Add/Modify section (3) at any time by selecting the ‘Clear’ button (18) in the Add/Modify section of the application.

The database may also be searched to locate specific items. A variety of parameters can be implemented in the Search (2) section of the application. A range of RFID numbers can be specified in the ‘RFID Range’ field (8). A Keyword search of the item descriptions can be done by entering a word in the ‘Description’ field (9). A current status filter can also be applied with the ‘Status’ pull-down menu (10). Items may be searched for by use of the ‘Dates Modified’ field (11) as well. Any single field or combinations of fields may be used to filter the information in the database and display the results in the data grid (1).



1. Inventory Data Grid
2. Search filter for data grid
3. Add/Modify for data grid
4. Column displays the item RFID#
5. Column displays the item description
6. Column displays the item status
7. Column displays the last date of the items modification in the database
8. 'RFID Range' box allows for a specified range of RFID numbers to be displayed in the data grid
9. 'Description' box allows for a keyword search to be used to filter the items displayed in the data grid
10. 'Status' box is used to display items with a specific status in the data grid
11. 'Date Modified' filter is used to display items which have last been modified in the specified time period
12. 'Search' button filters the data grid which then displays items based on the search parameters defined by 8,9,10 and 11
13. 'Clear' button clears the search parameters and displays all item information in the data grid
14. 'RFID #' box is used to specify the RFID number to either be added to, or modified in the inventory database
15. 'Description' box is used to specify the Description to be associated with the RFID number of the item located in 14

16. 'Status' box used to specify the current location for the item with the RFID number specified in 14
17. 'OK' button submits the new record/changed record to the database
18. 'Clear' button clears all of the boxes in the Add/Modify section
19. Minimizes the InventoryApp
20. Closes the InventoryApp

1.1 User Interface Troubleshooting

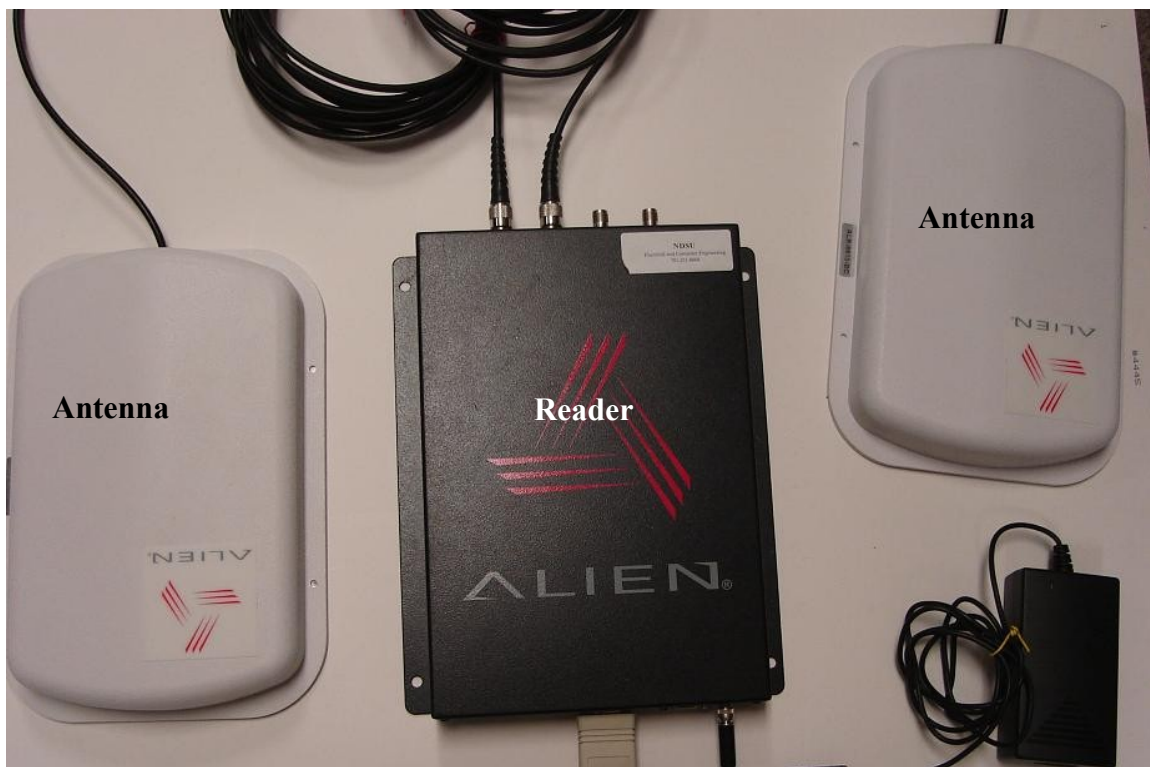
If the software will not load

- Confirm that the database “inventory.mdb” is located in the same directory as the program executable.
- Confirm that the Microsoft .NET Framework 2.0 is installed.
- Ask your administrator for administrative rights to the installation folder.

If an error occurs while running the program, restart the program.

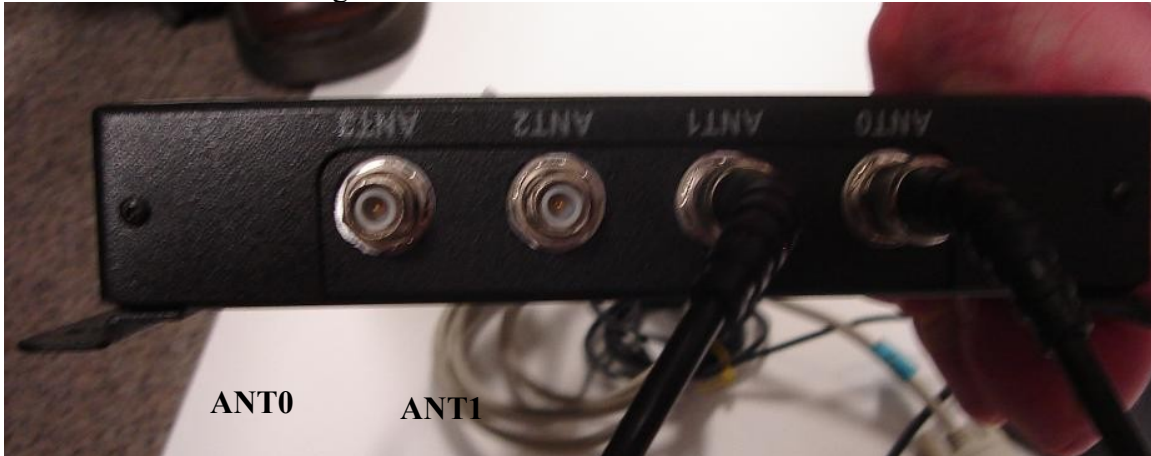
2. RFID

2.1 Installation

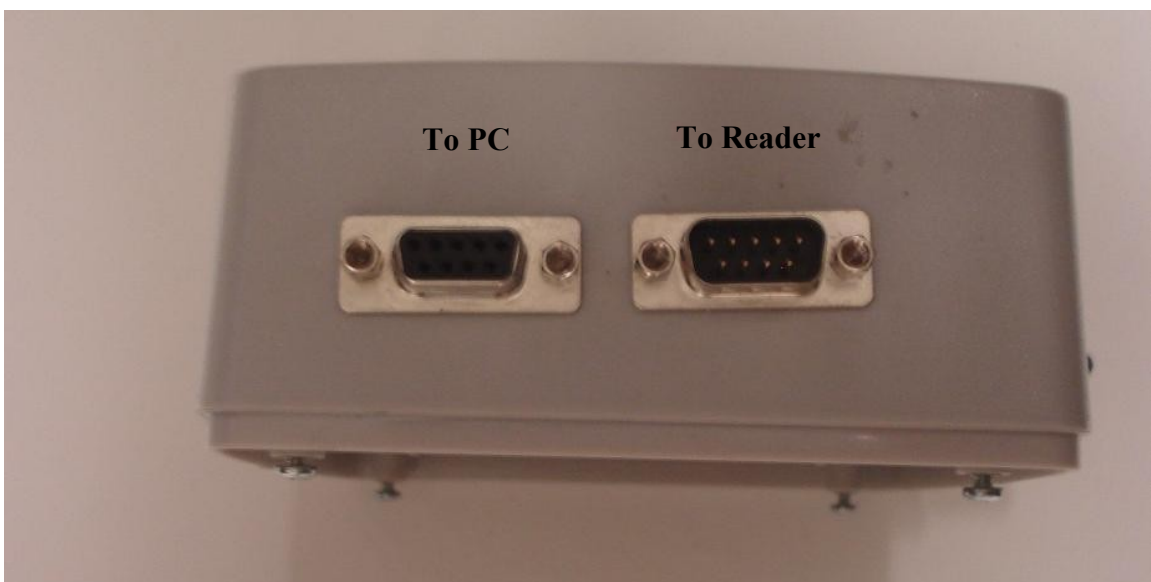


Mount RFID antennas around the gate to be monitored. The antennas should be approximately 15 feet apart. Mount the RFID reader on an exterior wall near the gate on the inside of the building. Route the coaxial cable from the antennas to the inside of the building and connect to the reader as shown below. Connect the antenna on the inside of

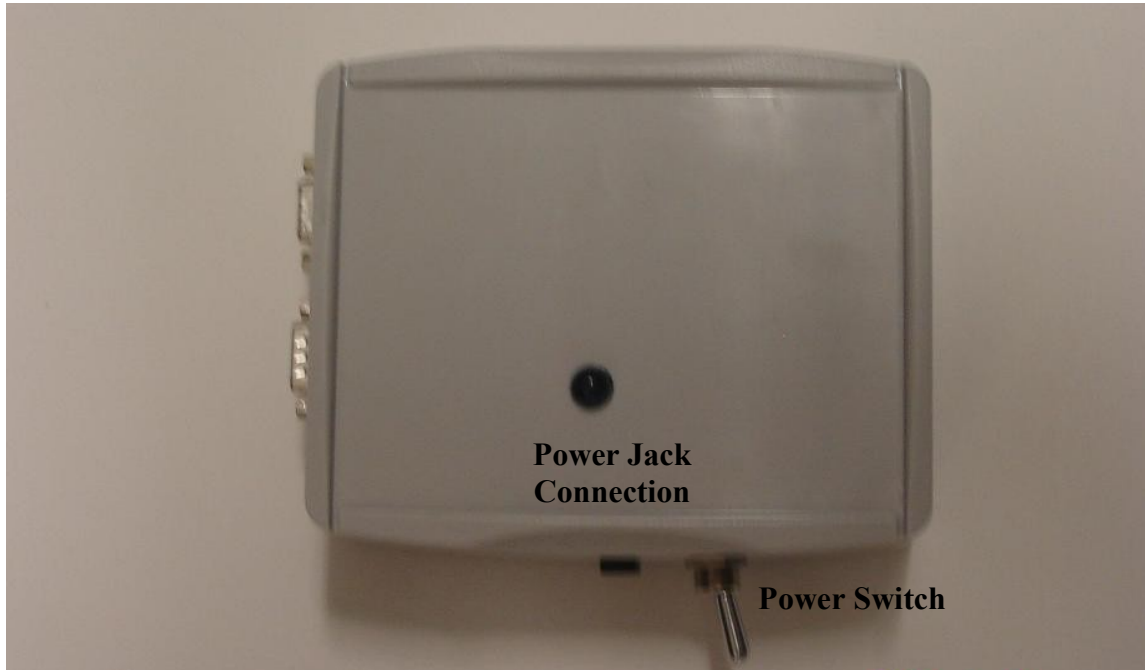
the gate to ANT0 and the antenna on the outside of the gate on ANT1. Cabling can be routed back to the building at the installer's discretion.



Mount the control unit on the wall next to the reader. Connect one RS232 cable between the reader and the control unit as shown below.



Connect a second RS232 cable between the control unit and a PC utilizing the user interface (see sec. 1 for details on operating the user interface). Connect the reader's power supply to a 120VAC outlet. Connect the control unit's power supply also to a 120VAC outlet.



Before mounting the tags on the vehicles each ID number must be entered into the user interface database.

2.2 Operations

Cycle power to the reader and wait until it has fully initialized. The LED's on the side of the reader should cycle through and then the green LED labeled CPU should be continuously lit. Turn on power switch on control unit (see previous page for location). The blue LED on the front cover should be illuminated. Open the user interface on the PC. The system should now display any traffic entering or leaving the yard.

2.3 Troubleshooting

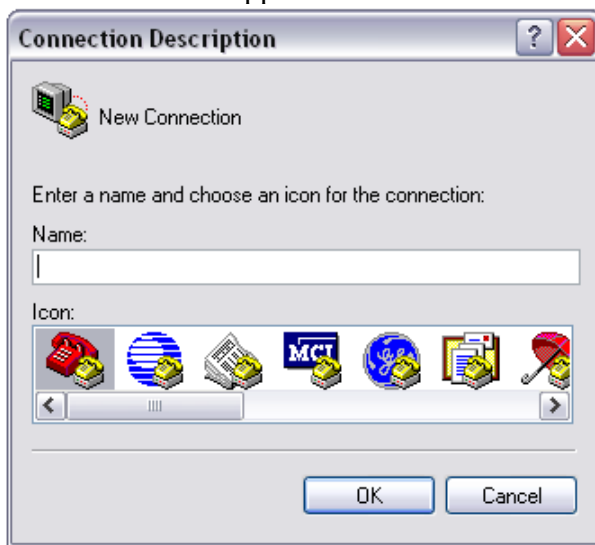
During normal operation, the reader and control unit communicate every second, when this occurs, the LEDs on the reader labeled TX and RX flash. When the control unit sends a command to the reader, the RX LED turns on. The RX LED flashes approximately every second as each command is communicated. When the reader sends the tag information back to the control unit the TX LED turns on. These two LED's should flash sequentially. If the above mentioned process does not occur, consult the table below for the possible fault and solution.

Fault	Solution
Reader CPU LED not lit	Verify power connection on reader
Control Unit LED not lit	Verify power connection on control unit, verify switch is on
Tag traffic not being logged	1. Verify tag ID is in database (See Sec. 1)
	2. Check communication cable connections

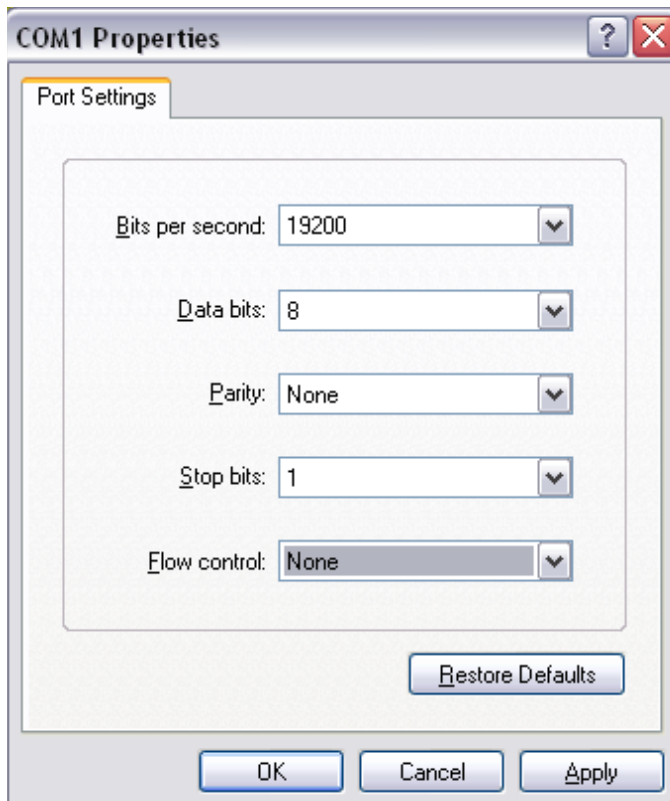
2.3.1 Hyper Terminal Troubleshooting

Another way of troubleshooting the unit is to view all the data being sent to the PC by the Hyper Terminal. To set up the Hyper Terminal:

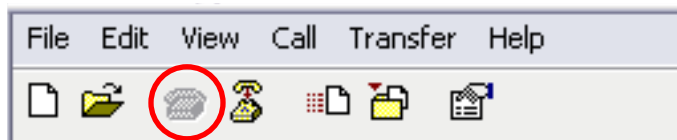
1. Open Hyper Terminal: Start >> Programs >> Accessories >> Communications >> Hyper Terminal
2. This box will appear:



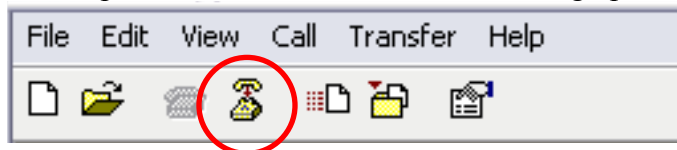
3. Enter a name (Ex: Test) and select OK
4. Select the COM port that the control unit is connected to and select OK.
5. Configure the next screen as the following



6. Select OK
7. The telephone with the receiver hung up should be gray in color. If not, click on this button to call the unit.



8. The Hyper Terminal should now display any tags passing through the gates. The ID numbers should be displayed as a four digit number followed by a colon (:) and then the antenna number (0, 1, 2, or 3).
9. To disconnect from the control unit either close Hyper Terminal or select the telephone icon with the receiver not hung up.



3. Active Transmitter

3.1 Installation

3.1.1 Receiver Mounting



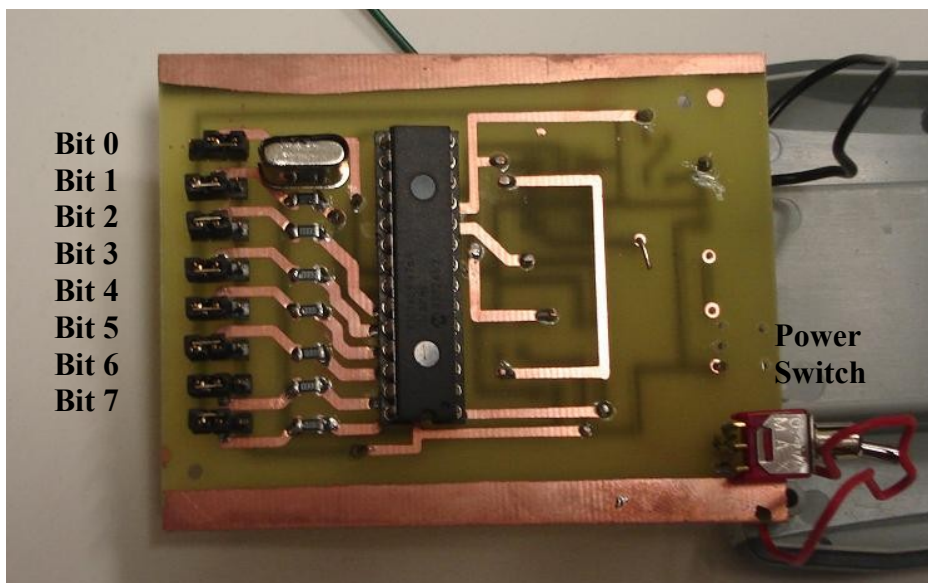
Pictured above is a receiver for the active tags. Mount one receiver fifteen feet inside the exit gate facing the drive path. Place the second receiver fifteen feet outside the exit gate facing also the drive path. Place both receivers approximately 7.5 ft. above the ground. After mounting the receivers, the power cable must be connected to a standard 120V wall outlet and a serial cable (RS232) must be run to a PC in order to analyze the collected data. The inside receiver's RS232 cable should be connected to COM1 on the PC, while the outside receiver's RS232 must be connected to COM2 on the same PC. One option for cable routing is to bind both cables together, place the combination in flexible tubing, and then run them from the receiver box to the PC. For the Receiver that is further away from the building, the cables could be buried to avoid wear on the cable and clutter in the gate access. This is just one possibility for cable routing from the receiver box to building. Cord routing is to be done at the user's discretion. Turn on both receivers using the power switches on the units.

3.1.2 Tag Mounting



Pictured above is an active tag. This tag is to be mounted onto any mobile device that needs to be tracked. Mounting of the device needs to have a metal free path from the tag to the receivers. Other considerations are to put a tag in a robust place so when the unit being tracked is in the field or being washed the tag is not destroyed or harmed.

3.1.3 Setting Tag Number



Pictured above is the back side of an active tag. To set the tag number, open the enclosure by removing the four screws to access the jumpers on the board. Simply arrange the jumpers on the left side of the tag (Pictured Above) to power or ground. Each jumper represents a bit in a simple binary sequence defining the tag number. Placing a jumper to power makes a bit a 1 while placing a jumper to ground makes a bit a 0. In the

picture shown above, the topmost jumper corresponds to the least significant bit of the tag number and the bottommost bit corresponding to the most significant bit. Arranging the jumpers will allow a simple binary number ranging from 0 to 255 (Decimal) to be set for each tag. For example: Place first and third jumpers to power and the remaining to ground. The result is calculated as follows:

$$\begin{aligned}
 &2^7 \times 0 + 2^6 \times 0 + 2^5 \times 0 + 2^4 \times 0 + 2^3 \times 0 + 2^2 \times 1 + 2^1 \times 0 + 2^0 \times 1 = \\
 &128 \times 0 + 64 \times 0 + 32 \times 0 + 16 \times 0 + 8 \times 0 + 4 \times 1 + 2 \times 0 + 1 \times 1 = \\
 &00000101b = 5
 \end{aligned}$$

This configuration will result in the tag number 5. After setting the tag number and adding batteries to tag (two AA batteries) turn tag on using the switch, seal the enclosure via four screws, and the tag is ready to go. There is no limit on how many times a tag can be renumbered. The hardware will update the tag number based on the jumpers approximately every three seconds when power on.

3.2 Operation

After powering on the receivers and all tags, the system will be up and running. All that is left to do is access the user interface on the PC. The system will now display any traffic entering or leaving the yard.

3.3 Troubleshooting

The first step to taking if something is not working is to check power connection to that particular device. If the power is on, check any other connections, such as the RS232 connection. Other problems should hopefully be addressed by the following chart.

Fault	Solution
No traffic on user interface	<ol style="list-style-type: none"> 1. Check power/RS232 connections; Make sure all devices are powered on. 2. Make sure metal is not blocking path from the Tag to the Receiver.
Not receiving correct tag number	Check connections on tag power/ground jumpers.
Tag not being logged in database	Check to make sure tag is initially added to database.

If you want to test your tag to make sure you are transmitting the right tag number you can check the number on the hyper terminal. To open and use the hyper terminal, reference the RFID troubleshooting in Section 2.3.1 (For the Active Tags use 115200 in the Bits per Second field rather than the RFID 19200 Bits per Second).